REDACTED VERSION

QUALITY ASSURANCE SAMPLING PLAN
FOR
LEO MILLER ROAD SITE
TAFT, SAN PATRICIO/ARANSAS COUNTIES, TEXAS

Prepared For

U.S. Environmental Protection Agency Region 6
1445 Ross Ave.
Dallas, Texas 75202

Date Prepared
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Reference Numbers

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1.0 INTRODUCTION

Dynamac Corporation (Dynamac) Superfund Technical Assessment and Response Team (START) has been tasked by the U.S. Environmental Protection Agency (EPA), Region 6, under Technical Direction Document (TDD) # TO-0009-08-01-01, to conduct a Site Inspection (SI) at the Leo Miller Road Site (LMRS) (CERCLIS No. TXN000606818), located near Taft, Aransas/San Patricio Counties, Texas (TX). The SI for the LMRS will also include evaluation of Sherwin Alumina Company (SAC) red mud lagoons (RMLs) located east of the LMRS. The LMRS and the four (4) RML operated by SAC are divided by the Aransas/San Patricio County Lines. See Figures 1 and 2 for the location of LMRS and SAC's four RMLs.

The SI is the result of a Preliminary Assessment (PA) that was completed for the LMRS by EPA in 2008. During the completion of PA it was determined that the LMRS has a potential to be placed on EPA's National Priorities List (NPL) based on identified waste characteristics associated with the SAC RMLs and the targets for the Air and Groundwater Migration Pathways. The focus of this SI will be to screen the LMRS for potential NPL listing by utilizing the criteria set forth in the Hazard Ranking System (HRS) and the Hazard Ranking System Guidance Manual. Secondly, the SI will provide the documentation necessary to support a decision by the EPA Region 6 Site Assessment Manager (SAM) regarding the need for further action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA). The SI will be prepared according to *Guidance for Performing Site Investigations Under CERCLA.*

It is anticipated that the field activities associated with the SI will be conducted April 2008. This Quality Assurance Sampling Plan (QASP) is prepared in partial fulfillment of the TDD. This QASP is designed to guide field operations during the collection of waste samples from the RMLs, the collection of dust samples from inside identified residences, the collection of groundwater samples from private water wells located along Leo Miller Road, and describe Quality Assurance measures that will be implemented during the course of the SI field activities.

2.0 OBJECTIVES

The objectives of the SI are: 1) to determine if the red mud inside the RMLs contain heavy metals that can be considered as a CERCLA hazardous substance, pollutant, or contaminant; 2) to determine if the red dust accumulating in the residential structures along Leo Miller Road contains CERCLA hazardous substances, pollutants, and contaminants that can be attributed to the SAC's RMLs; and 3) to determine if potential CERCLA hazardous substances, pollutants, or contaminants attributable to the SAC RMLs have entered the underlying groundwater and migrated towards the residential structures located on Leo Miller Road. To accomplish the above-mentioned objectives, START will collect red mud waste samples from select RMLs, visible red dust inside residential structures located along Leo Miller Road, and groundwater samples from identified water wells located along Leo Miller Road. All samples collected will be shipped to a Dynamac procured laboratory, Acutest, for total metals and mercury analyses.

3.0 BACKGROUND

3.1 Site Location and Description

LMRS is approximately 1 mile in length and runs in a southwest to northeast direction. LMRS traverses through two counties: San Patricio and Aransas (Figures 1 and 2). The area is sparsely populated, as approximately 20 residential homes were observed by the EPA/START reconnaissance team on October 9, 2007. The LMRS is bounded by rural land to the north, by State Highway (HWY)-188 to the northeast and northwest; the SAC RMLs to the east and south; and rural agricultural land to the west. The geographical coordinates for the LMRS are: 28.00831666° N and 97.21676666 ° W (San Patricio County); 28.01511666° N and 97.2124° W (Aransas County); and 28.01838333° N and 97.21031666° W (Aransas County). The geographical coordinates were collected during the EPA/START PA reconnaissance inspection with a hand-held geographical positioning system (GPS) unit.

SAC operates four RMLs (identified as RML-1 through RML-4) in the vicinity of the LMRS. RML-1 and RML-2 are bordered to the north by State HWY-188, to the east by Port Bay, to the south by rural land, and to the west by the LMRS and rural land. RML-3 and RML-4 are bordered to the north by Copano Bay, to the east by Port Bay, to the south by RML-1 and RML-2, and to west by the LMRS and rural land (Figures 1, 2, and 4). SAC, formerly Reynolds Metals Company-Sherwin Plant, is located on State Highway 361, near Gregory, Texas.

3.2 Operational History

The SAC facility has produced alumina at this location in Gregory, TX in excess of 50 years, beginning in 1953. The primary function of the Sherwin plant is to exact aluminum oxide (alumina) from bauxite ore using the "Bayer Process". The Sherwin process is a circulating loop of Bayer liquid with side processes such as mud clarification operating parallel to the principal liquor stream. The "Bayer Process" is an endless loop in which a steady flow of "Bayer Liquid" is pumped. The liquor varies in chemical consistency throughout the process and is both the extraction and transport media for the process chemicals. The constant active ingredient of this "liquor" is sodium hydroxide, or caustic soda, in which the aluminum hydrate is first dissolved from bauxite slurry at high temperature, and then clarified, allowed to cool, and then allowed to precipitate into crystals. The resulting crystals are then washed, filtered, and finished into one of the intermediate or final products. At any time within the "Bayer Process" loop, the circuit may contain up to 150 million gallons of water and Bayer liquor. This solution may contain up to 50,000 metric tons of caustic soda, 50,000 metric tons of aluminum hydrate, together with waste products, impurities, and make-up water. Each day, depending on the established production level, up to 10,000 metric tons of bauxite are added to the circulating liquor stream in order to produce as much as 4,400 metric tons of finished products and 3,600 metric tons (dry weight) of red mud tailings or residue each day. The Sherwin plant is capable of producing 1.4 million tons of smelter grade alumina and 300,000 tons of chemical grade alumina hydrate per year.

Bauxite is a naturally occurring earth material, which is surface-mined and is the principal source of aluminum hydrate worldwide. Aluminum hydrate is a feedstock used in the chemical industry to produce a wide range of products, such as Maalox, sandpaper, and water treatment agents. The aluminum hydrate can be further refined to produce aluminum oxide (alumina), which is used as the raw material in Aluminum Reduction plants to produce aluminum metal. At one point, the SAC plant obtained their source of bauxite from Australia, Jamaica, Brazil, and Guinea. Approximately 1 to 2 tons of red mud is produced per one ton of alumina, depending upon the grade of bauxite. The RMLs, which store the red mud residue, are located approximately 9 to 10 miles northeast of the SAC plant, on State HWY-188.

It does not appear that SAC has air permits associated with the RMLs. SAC does maintain Texas Commission on Environmental Quality (TCEQ) general air permit, No. 4971, for the bag house dust system for bauxite and alumina transport systems at the SAC facility. Air Permit No. 4971 does not include stipulations concerning the RMLs or air quality monitoring at the RMLs. TCEQ Air Permit No. 4971 was amended and approved by the TCEQ in October 2007. In addition to the general air permit, SAC submitted two air amendment applications for Maintenance, Startup, and Shutdown (MSS) activities at the SAC facility in Gregory, TX. These two air permit amendments are currently undergoing administrative review at the TCEQ. Neither MSS air permit amendments have any stipulations related to the red mud lagoon areas.

4.0 HRS EVAULATION AND DATA GAPS

This section will address the HRS data (source identification and pathway-specific data) identified during the completion of the PA and data gaps that need to be addressed during the SI.

4.1 Source Evaluation

The RMLs are referred to as RML-1 through RML-4. RML-1 and RML-2 are separated from RML-3 and RML-4 by State HWY-188. In addition, the Aransas/San Patricio County Line traverses though RML-1 and RML-2 (Figures 1 and 2). The combined size of

the four RMLs is approximately 148,800,000 square feet (ft^2) or 3,416 acres (Figure 2). The RMLs will be evaluated as surface impoundments. The red mud residue is transported by either pipeline or trucks, to the RMLs located approximately 9 to 10 miles northeast of the SAC plant. SAC subcontracts to a truck company to transport the red mud residue from the SAC facility. The red mud residue is reportedly transported to the RMLs on a frequency of 1 truckload per hour, for 8 hours a day, seven days a week.

Red Mud Lagoon 1: RML-1 is primarily rectangular in shape, is the southern-most located RML and is the oldest of the four RMLs (Figure 2). This potential source is approximately 48,100,000 ft^2 or 1,104.2 acres in size and is surrounded by an earthen levee (Figure 2). The total depth of RML-1 has not been obtained nor has data been obtained to indicate the annual amount of red mud residue disposed into RML-1. It appears that a portion of RML-1 has been closed and is no longer in use as a disposal area.

Red Mud Lagoon 2: RML-2 is rectangular in shape, is located south of State HWY-188 and is adjacent to RML-1. RML-2 is approximately 52,800,000 ft^2 or 1,212.1 acres in size and is surrounded by an earthen levee (Figure 2). The total depth of RML-2 has not been obtained nor has data been obtained to indicate the annual amount of red mud residue disposed into RML-2.

Red Mud Lagoon 3: RML-3 is polygonal in shape, is located north of State HWY-188 and west of Port Bay. It is separated from RML-4 by Copano Retreat Road. RML-3 is approximately 18,390,000 ft^2 or 422.2 acres in size and is surrounded by an earthen levee (Figure 2). RML-3 is the smallest of the four RMLs. The total depth of RML-3 has not been obtained nor has data been obtained to indicate the annual amount of red mud residue disposed into RML-3.

Red Mud Lagoon 4: RML-4 is polygonal in shape, is located north of State HWY-188 and west of Port Bay. RML-4 is approximately 29,510,000 ft^2 or 677.5 acres in size and is surrounded by an earthen levee (Figure 2). The total depth of RML-4 has not been obtained nor has data been obtained to indicate the annual amount of red mud residue disposed into RML-4.

Waste Characteristics: The waste being generated by SAC plant consists of red mud residue, commonly referred to as "red mud", because it resembles red mud. The red mud residue is classified as a Class II non-hazardous industrial waste. When the red mud residue is produced, it is alkaline, containing approximately 6 to 8 grams per liter (g/L) of residual sodium carbonate. The sodium carbonate will eventually weather to sodium bicarbonate (baking soda). The sodium carbonate fraction is water soluble and can raise the pH of water as high as 10.5. When the red mud residue dries, it becomes dusty if not managed properly. Disposal of red mud and other solid residues commonly takes place by spreading layers over a large surface area in order to allow the material to dry. This is in turn followed by rehabilitation of the land. No documentation has been obtained to indicate that the red mud residue from the SAC RMLs has been analyzed for hazardous constituents, such as heavy metals. Red mud residue may contain trace amounts of metals such as arsenic, barium, boron, cadmium, chromium, cobalt, gallium, vanadium, scandium, and lead, as well as radionuclides.

SAC claims that the red mud dust does not pose a serious health hazard, is not toxic, reactive, or flammable, but can be an irritant and cause discoloration. Citizens living along Leo Miller Road Site claim that the red mud residue generated during dry conditions has caused skin irritations and respiratory illnesses, such as chronic obstructive pulmonary disease (COPD), bronchitis, lung cancer, bronchial spasms, asthma, siderosis, pneomosicosis; burning in the eyes, skin, nose, and throat; exacerbation of allergies; sinusitis; digestive problems; headaches; nose bleeds; lethargy and fatigue; a persistent cough; hypertension; Alzheimer disease and beryllium disease. Beryllium disease is a term to describe the conditions resulting from exposure to beryllium and its compounds or alloys.

Identified Data Gaps: The primary data gap related to sources and waste characteristics is whether the red mud can be classified as a CERCLA hazardous substance, pollutant, or contaminant. This will be addressed by the collection and chemical analysis of red mud samples from the RMLs. Should chemical analysis of the red mud samples indicate the presence of CERCLA hazardous substances, pollutants, or contaminants, the RMLs can be

evaluated as HRS-defined sources. Other data gaps to be addressed include: 1) a determination of the actual waste quantity associated with each RML; 2) documentation of the type of waste containment system in place to limit the migration of CERCLA hazardous substances, pollutants, or contaminants from the source areas.

4.2 Groundwater Migration Pathway Summary

Groundwater Characteristics: The LMRS and RMLs are situated within the West Gulf Coastal Plain (WGCP), part of the Coastal Plain physiographic province of Texas. The WGCP province consists of marine sedimentary rocks that dip gently seawards towards the Gulf of Mexico. The major groundwater aquifer along the gulf coast is the Gulf Coast aquifer. The Gulf Coast aquifer extends from the Rio Grande River northeastward to the Louisiana-Texas border. Aransas and San Patricio Counties are underlain by the Gulf Coast aquifer. The stratigraphy of the Gulf Coast aquifer consists of a thick sequence of fluvial-deltaic sediments deposited as a wide belt generally trending northeast, parallel to and dipping gently toward the present Gulf coast. The fluvial-deltaic sediments consist of alternating sequences of unconsolidated to partially consolidated silt, clay, and sand. The Gulf Coast aquifer has been divided into four (4) units: Catahoula confining system, the Jasper aquifer, Evangeline Aquifer, and the Chicot aquifer. The youngest and shallowest unit is the Chicot aquifer. The Chicot aquifer is made up of the Willis Sand, the Bentley and Montgomery formations, the Beaumont Clay, and alluvial deposits at the surface. The total sand thickness in all four units ranges from 700 feet in the south to 1,300 feet in the north.

Documentation of the underlying stratigraphy at the RML has not been obtained; however, the stratigraphy of the SAC Plant has been documented and will be used in the evaluation for this SI. The upper 60 feet of sediment at the site has been differentiated into water-bearing and non-water-bearing units as described below. The unsaturated zone at the site consists of 6 to 18 feet of clay and silty clay of the native Beaumont Formation (Unit 1 Clay). Underlying the Unit 1 Clay is 4 to 17 feet of fine- to medium-grained silty sand (Zone A), which is generally continuous across the site. Zone A is underlain by 29 to 51 feet of high plasticity clay and silty clay (Unit 2 Clay). A deeper sand unit (Zone B)

underlies the Unit 2 Clay and consists of fine- to medium-grained silty sand. The thickness of the Zone B sand has not been established. Twenty-six (26) groundwater monitoring wells have been installed in the vicinity of the RMLs since 1968, three of which have been destroyed. Seventeen (17) additional monitoring/test wells were installed in 2002 by Texas A&M Kingsville graduate students around RMLs 1 and 2. The total depth of groundwater monitoring wells associated with RML-1 and RML-2 ranges from 14.8 feet to 59.66 feet below ground surface (bgs). According to a groundwater gradient map of RMLs 1 and 2, the shallow groundwater flow appears to trend in several directions: to the northeast towards State HWY-188 and RMLs 3 and 4; to the northwest towards the LMRS; and to the east toward Port Bay. The total depth of groundwater monitoring wells associated with RML-3 ranges from 19 feet to 40.5 feet bgs. According to a groundwater gradient map of RML-3, the shallow groundwater flow appears to trend toward the west and RML-4, not towards Port Bay and Copano Bay. The total depth of groundwater monitoring wells associated with RML-4 ranges from 13.19 feet to 20.66 feet bgs. According to a groundwater gradient map of RML-4, the shallow groundwater flow appears to trend toward the west and away from RML-3, Port Bay and Copano Bay.

Likelihood of Release: Groundwater samples were collected from the monitoring wells associated with RML-1 through RML-4 as part of the groundwater monitoring plan for SAC, by Naismith Engineering. The collected samples were analyzed for groundwater quality parameters such as Total Dissolved Solids (TDS), Nitrate as N, Total Organic Nitrogen, Chloride, Sulfate fluoride, ammonia, mercury, and Hardness as calcium carbonate; total metals such as arsenic, barium, cadmium, chromium, nickel, and vanadium; and polychlorinated biphenyls (PCBs). In summary, the heavy metals aluminum, arsenic, barium, boron, manganese and nickel were detected in concentrations that exceeded the laboratory reporting limits (RLs) for the samples collected from the perimeter of RML-1 and RML-2. The heavy metals, arsenic, barium, boron, and manganese were detected in concentrations that exceeded the laboratory RLs for the samples collected from the perimeter of RMLs 3 and 4. PCBs were not detected in any of the groundwater samples collected along the perimeters of the RMLs. The metal

concentrations detected in the monitoring well samples were compared to the EPA's National Primary Drinking Water Standard, the Maximum Contaminant Levels (MCL) for inorganic constituents (antimony, arsenic, beryllium, cadmium, chromium [total], copper, lead, mercury, and selenium) for possible exceedances. Comparison to the MCLs indicate two exceedances for arsenic (MCL: 10.0 µg/L), in the monitoring well samples. The first exceedance was identified at monitoring well MW-04, which is associated with RML-2. Arsenic was detected in MW-04 at a concentration of 11.0µg/L. The second arsenic MCL exceedance was documented at monitoring well MW-4-2, which is associated with RML-4. Arsenic was detected in MW-4-2 at a concentration of 15.0µg/L. Based on the analytical results of the collected groundwater samples from the perimeter of the RMLs, a potential does exist for suspected groundwater contamination with metals. Groundwater samples have not been collected from the residential water wells identified along Leo Miller Road.

Groundwater Targets: Along Leo Miller Road, the residents maintain groundwater wells; some of which may be used for drinking water purposes. The nearest identified drinking water well is identified at the residence located at 111 Leo Miller Road Site. According to the resident at this location, the well is approximately 280 feet in depth. The resident must "distill" the groundwater before it can be used for drinking. This residence is located approximately 0.5 miles from the northwest corner of RML-2 (Figure 3). However, according to a local citizen, the majority of the private domestic water wells in the area are not used as a drinking water source, due to the brackish nature of the groundwater. The groundwater wells are used primarily to provide water for cleaning laundry and dishes, and watering lawns and gardens. Several rural water companies have been identified in the vicinity of the site; however, only the Rincon Water Supply Company (WSC), Division 1 supplies drinking water to those residents living within the 1 to 2 mile radius, the 2 to 3 mile radius, and the 3 to 4-mile radius (Figure 3). The Rincon WSC, Division 1 supplies water to approximately 326 meters. The service boundary for Rincon WSC, Division 1 includes those residents residing along County Road (CR) 96, CR 98, CR 102; west of CR 89M and east of CR 95C to 95A. No other water supply

systems have been identified within the 4-mile Target Distance Limit (TDL) that obtains drinking water from groundwater wells. It is currently assumed, that all residents within the 4-mile TDL obtain their drinking water from private, domestic water wells, except for those individuals obtaining potable water from Rincon WSC, Division 1. It should be noted that the actual number of residents utilizing domestic water wells for their drinking water source is not known. There are also residents within the 4-mile TDL that purchase bottled water for their drinking water source (Ref. 7, p. 4).

Groundwater Migration Pathway Data Gaps: The primary data gap to be addressed during the SI field activities will be the determination of an observed release of CERCLA hazardous substances, pollutants, or contaminants, attributable to the RMLs, in the residential water wells located along Leo Miller Road.

4.3 Air Migration Pathway

Likelihood of Release: The residents on Leo Miller Road are located northwest of RMLs 1 and 2 (Figures 1 and 2). The annual prevailing wind direction is from the southeast to the northwest, thus, the residents are located downwind of RMLs 1 and 2. It has been reported that the homes and lawns have become covered in red mud dust during the frequent dust storms. One land owner has video graphic documentation of the red dust being blown from the red mud lagoons toward their residence. The EPA/START team observed red dust both outside and inside the windows at one residential home located along the LMRS. Neither air samples nor wipe samples have been collected and analyzed to ascertain if hazardous constituents, such as heavy metals, exist as part of the chemical makeup of the red mud residue or dust. Based on the video graphic documentation made available to the EPA/START team, it does appear that a suspected air release by direct observation may have occurred at the LMRS; however, documentation has not been obtained to indicate that the red mud residue or dust contain hazardous constituents.

Air Pathway Targets: The 4-mile radius is rural in nature and appears to be sparsely populated (Figures 1 and 2). The distance to the nearest individual or regularly occupied building (Leo Miller Road Site) is approximately 0.5 miles west of RMLs 1 and 2 (Figure

3). On Leo Miller Road Site, CR 4351, and CR 1177 approximately 75 families have been documented. The total number of individuals residing within the 4-mile TDL, based on Tiger census data for 2000, is 4,198.

Air Migration Pathway Data Gaps: The primary data gap to be addressed during the SI field activities is to determine if the red mud dust contains CERCLA hazardous substances, pollutants, or contaminants that can be harmful to human health and the environment. This data gap will be addressed with the collection of wipe samples from inside the residential homes located on Leo Miller Road. In addition, if CERCLA hazardous substances, pollutants, or contaminants can be identified in the red mud, an observe release by direct observation may be documented to the Air Migration Pathway. This may be substantiated with the collection of red mud samples from the RMLs and the collection and chemical analysis of the wipe samples collected from inside the residential structures.

5.0 FIELD OPERATIONS

5.1 Concept of Operations

5.1.1 Schedule

Field work will begin the week of May 6, 2008 and is anticipated to require approximately 2 to 3 days to complete. Collected red mud, wipe samples, and groundwater samples will be shipped to a Dynamac procured laboratory, via Federal Express, within 1 to 2 days of sample collection. Acutest will provide the laboratory results (verbal) to START within 10 working days. In addition, Acutest will provide a Level IV analytical data package and Staged Electronic Data Deliverable (SEDD) to START within 20 days of sample receipt by Acutest.

5.1.2 Health and Safety

The LMRS is located north of Corpus Christi, Texas where temperatures and humidity can rise dramatically. Work will be conducted in personal protective equipment (PPE) Level D and C, dependent upon the perceived contaminant threat. Personnel may be physically stressed due to high temperatures during the red mud sample collection activity. Field activities will be conducted in accordance with

EPA ERT Standard Operating Procedures (SOPs), and Dynamac site-specific Health and Safety Plan (HASP).

5.1.3 Site Access and Logistics

Site access to SAC's RMLs and the residential properties along Leo Miller Road will be obtained by the EPA SAM, Bret Kendrick; however, access to designated background sample locations will be obtained during the scheduled field activities.

5.2 Sampling Design

Dynamac START has designed this Quality Assurance Sampling Plan (QASP) to collect red mud from locations in the RMLs, wipe samples inside residential properties, and groundwater samples from identified water wells. Sample locations may be revised in the field due to access issues, lack of red mud dust inside the residential structures, or inoperable water wells. Table 1 presents the anticipated number of red mud, wipe, groundwater, and sediment samples, location descriptions, and laboratory analyses. Dedicated sampling equipment will be used wherever possible in an effort to eliminate any potential cross contamination concerns. All sampling activities will be documented in a logbook and photographically.

5.3 Source Sampling

Samples of the red mud being deposited into the RMLs will be collected by START during the SI field activities in order to determine if the red mud contains CERCLA hazardous substances, pollutants, or contaminants in the form of heavy metals. Should concentrations of heavy metals be detected in the red mud, the RMLs can be defined as a HRS source type.

To determine the chemical composition of the newly generated red mud, biased red mud samples will be collected near the effluent pipe in RML-1 and RML-2. It is proposed that two samples of newly generated red mud be collected from RMLs 1 and 2, which are located nearest to the residents along Leo Miller Road. If newly generated red mud is not being disposed into either RML-01 or RML-2, the newly generated red mud will be collected from RML-3 and RML-4.

To determine the chemical composition of the dry red mud that has been disposed into the RMLs, it is proposed that judgmental, biased dry red mud samples be collected from RML-1 and RML-2. RML-1 and RML-2 were selected for sampling due to their proximity to the LMRS. It is proposed that one dry red mud sample be collected from each RML, for a total of two dry red mud samples. Overall, a total of five red mud samples (including one duplicate sample) will be collected to determine the metals concentration within the dry red mud.

The red mud samples will be collected according to EPA ERT's SOP No. 2012 – *Soil Sampling* and EPA's, *Superfund Representative Sampling Guidance, Volume 4, Waste Sampling* (Appendices A and B). The newly generated red mud samples will be collected either with the use of a plastic trowel or a telescopic dipper with attached beaker. The sample matrix will be transferred to a plastic mixing bowl for homogenization. The dry red mud from the RMLs will be collected with plastic trowels and plastic mixing bowls or the use of a hand auger. The dry red mud will be collected at 0 to 6 inches below the surface of the red mud. The sample locations at each RML will be randomly selected. After homogenization, the sample matrix will be transferred to the pre-labeled sample containers. See Table 1 for the proposed red mud samples and locations. Analytical methods, preservation, and bottle requirements are specified in Table 2.

5.4 Dust Sampling

In order to determine the metals concentrations of the red dust that has accumulated inside the residential homes located on Leo Miller Road, wipe samples will be collected during the SI field activities. START has identified three residential homes on Leo Miller Road in which wipe samples will be collected. These locations include: the residence at 28.00831666° N and 97.21676666 ° W, located in San Patricio County; the residence at 28.01511666° N and 97.2124° W, located in Aransas County, and the residence at 28.01838333° N and 97.21031666° W, also located in Aransas County. A background or upwind residential home will be identified and sampled during the SI field activities in order to determine background concentrations of the total metals.

The wipe samples will be collected from inside the window sills of each respective residence. Window sills to be sampled will be those windows that directly face RML-1 and RML-2 (east windows) and have direct contact with the dust being generated at RML-1 and RML-2. Additional wipe samples may be collected from window sills located throughout the residential structures. It is anticipated that a minimum of two wipe samples will be collected per household. A minimum of ten wipe samples (including a duplicate wipe and blank samples) will be collected during the course of the SI field activities.

START will utilize wipe sampling procedures established in EPA's Emergency Response Team (ERT) Standard Operating Procedure (SOP) No. 2011 – Chip, Wipe, and Sweep Sampling (Appendix C). Wipe sampling procedures are summarized as follows: 1) the area to be sampled is measured off (0.5 to 1 square foot area) and photo-documented, 2) a sterile gauze pad is saturated with de-ionized water, 3) a vertical wipe, followed by a horizontal wipe of the area to be sampled, and 4) wipe sample placed in amber-teflon-lined sample container for transport to the laboratory (Appendix C). See Table 1 for the number and wipe sample locations. Analytical methods, preservation, and bottle requirements are specified in Table 2.

5.5 Groundwater Sampling

During the PA reconnaissance inspection, EPA/START identified three residential homes that maintain operable water wells, one of which is used for drinking water purposes. The identified water wells are located at the three residences in which wipe samples will be collected. See Section 5.4 for the groundwater sample locations. Based on historical data, these three well locations are located downgradient of RML-1 and RML-2. One to two upgradient water wells will be identified and sampled in order to determine the background concentrations of total metals in the groundwater.

In order to obtain groundwater samples representative of the sampled aquifer, the identified water wells will be purged prior to sample collection. Prior to purging, water quality parameters, including temperature, conductivity, pH, and dissolved oxygen, will be obtained using a Horiba water quality probe to obtain initial water quality readings.

Because it is anticipated that the designated wells are active water wells, the wells will be allowed to purge for five minutes in order to remove any stagnant water from the well casing. Water quality parameters will be monitored during purging activities and purging activities will be deemed completed when the water quality parameters have stabilized within 0.10 units. If the identified water wells are not currently active, the purging time will be increased to 10 to 15 minutes or until water quality parameters have stabilized. Per well owner's approval, the purged water will be allowed to flow on the ground surface. After purging has been completed, START will collect a sample from the spigot located on the well water reservoir. The water sample will be collected from a point preceding any treatment systems attached to the water well system, where possible. If a treatment system is in place on the well to be sampled, it will be noted in the field logbook.

To collect the groundwater sample after purging, the water will be allowed to flow from the well spigot, directly into pre-cleaned and certified 1-liter high density polyethylene (HDPE) sampling containers (Appendix D). It is anticipated that START will collect a total of six to eight groundwater samples during the scheduled SI field activities. See Table 1 for a list of potential groundwater wells to be sampled. Analytical methods, preservation, and bottle requirements are specified in Table 2.

5.6 Analytical Parameters

All collected red mud, wipe (dust), and groundwater samples will be analyzed by Accutest Laboratories, as arranged by the Dynamac-START chemist, for total metals and mercury using EPA SW-846, Methods 6010C/7471. The requested Turn Around Time (TAT) for the preliminary analytical results will be 10 business days, and the requested TAT for the final analytical data packages and corresponding Staged Electronic Data Deliverable (SEDD) will be 20 business days.

5.7 Sample Preservation

The collected red mud and wipe samples will be preserved to 4° Celsius (°C) with the addition of bagged ice to the sample shipping coolers. No other preservatives will be utilized for the red mud or wipe samples.

The groundwater samples will be preserved with nitric acid (HNO_3) in order to suspend the metals in the liquid matrix. Nitric acid will be added to the sample container, via a dedicated pipette, in order to preserve the sample to a pH less than 2.0 units.

5.8 Sample Packaging and Shipping

After the samples have been collected, the sampling data (station number, time collected, sampler, GPS coordinates, etc.,) will be entered into a database using the U.S. EPA's SCRIBE Enterprise software. SCRIBE Enterprise will be used to generate sample labels and Chain-of-Custody (COC) forms for the collected samples. In addition, SCRIBE Enterprise will serve as the sampling database for the Leo Miller Road SI.

All samples will be packaged in appropriate sample containers. At a minimum, each sample container will contain a completed custody seal, bubble-wrapped, and placed in an individual plastic baggie. The packaged samples will then be placed into shipping coolers for shipment to Acutest Laboratories. Ice will be placed in the shipping cooler to preserve the collected wipe samples to 4° Celsius during transport to the laboratory. Completed custody seals will be placed on the outside of the shipping cooler in order to maintain the chain of custody of the collected samples.

5.9 Control of Contaminated Materials

Any investigation derived waste (IDW) generated through sampling operations will be contained in accordance with EPA ERT SOP No. 2006 (Appendix E). It is anticipated that IDW will consist of PPE and sampling equipment. If an appropriate disposal facility is not available on site, all IDW will be disposed of at the direction of the EPA SAM. It is anticipated that all sampling equipment will be dedicated. However, if non-dedicated sampling equipment is used, it will be decontaminated prior to use. Basic decontamination will consist of brushing gross particulate off sampling equipment with tap water and/or a scrub brush, followed by washing equipment with a soap solution of Liquinox® or Alconox® and tap water, a rinse in tap water, and a final rinse using distilled or de-ionized water. After decontamination, the equipment will be allowed to gravity drain and air dry.

The equipment will be wrapped in aluminum foil to minimize potential contamination if not immediately used.

6.0 QUALITY CONTROL

6.1 Laboratory Quality Control

Specific QC criteria have been developed to ensure that the Data Quality Objectives (DQOs) established in this QASP are met. The analytical method for sample analysis has been selected on the basis of the required detection limits, known contaminants existing in the study area, and the range of analytes to be determined. Table 2 presents method numbers and reference guidance, sample containers, sample volume requirements, and sample preservatives.

6.2 Field Quality Control

The Horiba Water Quality instrument unit will be calibrated by START prior to use in the field. Parameters to be calibrated include pH, conductivity, dissolved oxygen, salinity, and turbidity. All calibrated readings will be recorded in the field logbook. START will use the Horiba's manufactures instruction manual on the use of the water quality instrument.

All samples will be collected, handled, and preserved as described in EPA ERT SOP's (Appendices B and C).

6.3 Quality Assurance Samples

For Quality Assurance (QA) purposes, matrix spike/matrix spike duplicate (MS/MSD) samples will be collected on a frequency of 5%, per sample matrix. MS/MSD samples measure the performance of the method used, relative to the sample matrix, and the precision of analysis in terms of relative percent difference (RPD). It is anticipated that one MS/MSD sample will be designated for the red mud (solids), wipe (dust), and groundwater (liquids) samples.

Field duplicate samples, which are homogenized aliquots of a single sample used to assess the quality of sampling methods, sample handling, and laboratory procedures, will be

collected on a frequency of 1 per 10 per matrix (10%) (Table 2). It is anticipated that one field duplicate sample will be collected for the red mud, wipe, and groundwater samples during the SI field activities.

One field blank, consisting of preserved de-ionized water, will be collected in order to determine if airborne contamination has influenced the liquid sample matrix during transfer of the sample containers from one location to the next. One wipe blank sample will be collected and submitted to Accutest Laboratories in order to determine the metals concentrations prior to the collection of the red dust from inside the residential homes (Table 2).

6.4 Chain of Custody

After sample collection and identification, all samples will be handled in strict accordance with chain-of-custody protocol. All sampling data will be entered into the U.S. EPA's SCRIBE Enterprise software, which will provide a database of all sample collection data and prepare the necessary Chain-of-Custody forms and sample labels. A chain-of-custody record will be maintained from the time the sample is taken to its final deposition. Every transfer of samples and custody must be noted and signed for, and a copy of this record kept by each individual who has signed. When samples (or groups of samples) are not under direct control of the individual responsible for them, they must be stored in a locked container sealed with a custody seal.

The Chain of Custody record should include (at minimum) the following:

- Sample identification number
- Sample information
- Sample location
- Sample date
- Name(s) and signature(s) of sampler(s)
- Signature(s) of any individual(s) with control over samples

7.0 RECONCILIATION WITH DATA QUALITY OBJECTIVES

The solids/groundwater sampling data will be assessed for accuracy, precision, completeness, representativeness, and comparability. Data assessment criteria are presented in the START-3 Generic QAPP, Section 4.0 "Assessment and Oversight" and Section 5.0, "Data Validation and Usability." Generally, data that do not meet the established acceptance criteria are cause for re-sampling and re-analysis. However, in some cases, data that do not meet acceptance criteria are usable with specified limitations. Data that are indicated as usable with limitations will be included in the final report, but will be clearly indicated as having limited usability. Indicators of data limitations include data qualifiers, quantitative evaluations, and narrative statements regarding potential bias. Dynamac-START will conduct the data validation activities on the received Accutest analytical data packages.

8.0 DELIVERABLES AND PROJECT ORGANIZATION

At the completion of field activities and receipt of validated laboratory analytical data, a SI Report will be completed and submitted to the EPA. The report will document all pertinent field and sampling activities, source and pathway specific documentation, and the results of sample laboratory analyses.

The EPA SAM, Bret Kendrick, will provide overall direction for this project and will identify sampling needs, determine the sampling schedule, and coordinate community relations.

The Dynamac START Task Leader (TL), Steve Cowan is the primary contact with the EPA. The START TL is responsible for project team organization, supervision of all project tasks, monitoring, and documenting the quality of all work produced by the project team, determining deviations from the QASP, and assisting with the overall sampling effort. The Dynamac Laboratory QC Coordinator is the primary contact with the analytical laboratory. The analytical results of the samples collected during the removal site assessment will be verified by Ms. Lisa Graczyk, a chemist with Dynamac-START. To facilitate this process, Dynamac-START has requested a Stage 2a SEDD and a Level IV data package from Acutest, the START-procured laboratory.

TABLE 1: SAMPLE COLLECTION SUMMARY

SAMPLE MATRIX	SAMPLE LOCATION	SAMPLE DESCRIPTION	COMPOSITE OR GRAB	SAMPLE ID	ANALYSIS	HRS PATHWAY
Red Mud	Red Mud Lagoon 1	To be collected from Red Mud Lagoon 1 (wet red mud); MS/MSD	Composite	RML1-RM01-C	Total Metals and Mercury	Source Evaluation
Red Mud	Red Mud Lagoon 1	To be collected from Red Mud Lagoon 1 (dry red mud)	Composite	RML1-RM02-C	Total Metals and Mercury	Source Evaluation
Red Mud	Red Mud Lagoon 2	To be collected from Red Mud Lagoon 2 (wet red mud)	Composite	RML2-RM03-C	Total Metals and Mercury	Source Evaluation
Red Mud	Red Mud Lagoon 2	To be collected from Red Mud Lagoon 2 (dry red mud)	Composite	RML2-RM04-C	Total Metals and Mercury	Source Evaluation
Red Mud	Red Mud Lagoon 1	To be collected from Red Mud Lagoon (dry red mud)	Composite	RML1-RM05-C (Duplicate of RML1-02-C)	Total Metals and Mercury	Source Evaluation
Red Dust	(b) (6) Residence	Collected from Window Sill #1	Grab	MART-RD01-G	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #2	Grab	MART-RD02-G	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #1	Grab	SAL-RD03-G	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #2	Grab	SAL-RD04-G	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #2	Grab	SAL-RD05-G (Duplicate of SAL-RD03-G)	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #1	Grab	BENN-RD06-G	Total Metals and Mercury	Air Migration
Red Dust	(b) (6) Residence	Collected from Window Sill #2	Grab	BENN-RD07-G	Total Metals and Mercury	Air Migration

TABLE 1: SAMPLE COLLECTION SUMMARY

SAMPLE MATRIX	SAMPLE LOCATION	SAMPLE DESCRIPTION	COMPOSITE OR GRAB	SAMPLE ID	ANALYSIS	HRS PATHWAY
Red Dust	Background Residence (TBD)	Collected from Window Sill #1	Grab	BKG-RD08-G	Total Metals and Mercury	Air Migration
Red Dust	Background Residence (TBD)	Collected from Window Sill #2	Grab	BKG-RD09-G	Total Metals and Mercury	Air Migration
Red Dust	Blank	Blank Wipe	Grab	BW-RD10-G	Total Metals and Mercury	Air Migration
Groundwater	(b) (6) Residence	Collected from (b) (6) Water Well	Grab	MART-GW-01-G	Total Metals and Mercury	Groundwater Migration
Groundwater	(b) (6) Residence	Collected from (b) (6) Water Well	Grab	SAL-GW02-G	Total Metals and Mercury	Groundwater Migration
Groundwater	(b) (6) Residence	Collected from (b) (6) Water Well	Grab	BENN-GW03-G	Total Metals and Mercury	Groundwater Migration
Groundwater	(b) (6) Residence	Collected from (b) (6) Water Well	Grab	BENN-GW04-G (Duplicate of BENN-GW03-G	Total Metals and Mercury	Groundwater Migration
Groundwater	Background Residence (TBD)	Collected from Background Water Well	Grab	BKG-GW05-G-	Total Metals and Mercury	Groundwater Migration

KEY:

BENN - (b) (6) Residence
BKG - Background
C - Composite
G - Grab
GW - Groundwater
MART - (b) (6) Residence
RM - Red Mud
RML - Red Mud Lagoon
RD - Red Dust
SAL - (b) (6) Residence
TBD - To Be Determined

TABLE 2: SAMPLING and ANALYSIS SUMMARY

Matrix	Analytical Parameter	Analytical Method	Containers (Number, Size, and Type)	Preservation Requirements	No. of Sampling	No. Field Duplicates	No. MS/MSD Pairs	No. of Equipment Rinsate Samples	No. of Field Blanks	Total Number of Samples to Lab*
Red Mud (Solid)	Total Metals and Mercury	SW-846, Methods 6010C / 7471	2, 8-oz. G wide-mouth jar	Ice, Cool to 4°C	4	1	1	0	0	6
Dust (Solid)	Total Metals and Mercury	SW-846, Methods 6010C / 7471	Sterile gauze, de-ionized water, and amber jars	Ice, Cool to 4°C	8	1	1	0	0	10
Groundwater	Total Metals and Mercury	SW-846, Methods 6010C / 7471	1, 1-liter HDPE	HNO_3, pH < 2.0, Ice, Cool to 4°C	4	1	1	0	1	6

Notes:

*Total number of samples to the laboratory does not include MS/MSD samples. However, please note that MS/MSD or spike/duplicate analysis may require additional sample volume.

°C – Degrees Celsius

G – Glass

HNO3 - Nitric Acid

HDPE - High Density Polyurethane

MS/MSD – Matrix Spike/Matrix Spike Duplicate

No. – Number

Oz - Ounce